

MODULE I: FUNDAMENTALS OF OPERATIONAL FARM HEALTH MANAGEMENT IN AQUACULTURE

Hybrid training: online component & residential week
Residential Week : March 2–6, 2026

Course Masters	Bartolomeo Gorgoglione, Francesca Carella, Lucas Bargelloni, Prof Patrick Kestemont, Ignacio De Blas Giral, Olga Haenen, Anna Toffan, David Parfouru, Amedeo Manfrin, Mario Ignacio Algüerno
Moderador	Alexandre Beljean
Administrador	Pierre Cadot

Introduction

This advanced training prepares experts to support farmers in disease prevention, biosecurity, surveillance, and product quality—from farm to national level. The course includes an online component and an in-person session, delivering field-relevant knowledge and practical applications.

Online courses – 46 hours

Introduction	15 min
<ul style="list-style-type: none"> • Welcome participants and present the WVEPAH initiative • Participant introductions (round table) • Overview of the training program and practical details 	

Alexandre Beljean	30 min
Threats to aquaculture and the need for a holistic approach to health management <ul style="list-style-type: none"> • Present a vision of health management in aquaculture systems. • Highlight the roles of management, environment and structures, animals, farmers, feed and feeding, biosecurity, and health. • Key message: Sustainable performance requires a well-balanced farm system. 	

Bartolomeo Gorgoglione	5h
Anatomy and physiology <ul style="list-style-type: none"> • General principles of anatomy and physiology: Respiration, excretion, digestion, reproduction, immunity. • External barriers: Skin and Mucus, Gills, Gut. Internal defenses, immunity (specific, non-specific. Importance of the integrity of barriers and defense. (Knowing the aspect of healthy organs). • Larvae & Fry, the difference between marine/freshwater larvae/fry physiology and their needs. Broodstock. • Stress in Fish. 	

Francesca Carella	1h
Anatomy and physiology: <ul style="list-style-type: none"> • Overview in Shellfish 	

Lucas Bargelloni	2 h
Genetics applied to aquaculture: <ul style="list-style-type: none"> • Understand and become familiar with genetics in aquaculture • Overview of different genetic improvement programs and potential bottlenecks • Selection of traits in finfish: <ul style="list-style-type: none"> ○ Reproduction ○ Disease resistance ○ Improved performance • Concepts explained: <ul style="list-style-type: none"> ○ SPF (Specific Pathogen Free) ○ Resistant strains 	

Patrick Kestemont	10 h
Production structures and environment in aquaculture: <ul style="list-style-type: none"> • Environmental parameters in aquaculture outside and inside the farm: Water parameters and soil parameters. • Open systems (for grow-out and/or fingerlings/ for shellfish) • Closed systems & RAS : Hatcheries, Nurseries • Multitrophic systems. 	6 h
Feed, feeding and nutrition in freshwater and marine species: <ul style="list-style-type: none"> • New and old technologies to produce (feed companies) and distribute feed (fish farmers) to aquatic animals. Special note for the medicated feed. 	4 h

<ul style="list-style-type: none"> • The specific nutritional needs of farmed freshwater and marine species. • The good practices of feeding animals: Feeding rates, N° meals, timing, transitions. • Feed quality and health problems in Aquaculture. 	
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Ignacio DE BLAS GIRAL	To be delivered
Epidemiology in aquaculture : <ul style="list-style-type: none"> • General Principles – Disease distribution, determinants, control • Risk Evaluation / Farm Records – Species, stocking, feed, water, disease history, treatments • Surveillance <ul style="list-style-type: none"> - Risk-based - Active - Passive • Diagnostics & Sample Size – Correct interpretation, statistically valid sampling • Treatment/Vaccination Trials – Efficacy checks; not all farms suitable • GIS in Aquatic Health – Disease mapping, surveillance, outbreak response • Disease Outbreak Management – Detection, containment, eradication, monitoring 	5 h

Olga Haenen	To be delivered (6h)
Main Pathologies in Aquaculture <ul style="list-style-type: none"> • Fish – Main Bacterial Diseases <ul style="list-style-type: none"> ○ Aeromonads (motile & non-motile), Flavobacterium, Streptococcus, Lactococcus, Edwardsiella ○ Vibriosis, Tenacibaculosis, Rickettsia, Nocardia, Francisella, Mycobacterium marinum ○ Epitheliocystis • Fish – Viral Diseases (Tilapia) <ul style="list-style-type: none"> ○ TLEV (Herpesvirus) ○ Bohle iridovirus (Spinning Tilapia Syndrome) ○ Other viruses (see Anna Toffan's course) • Fish – Other Pathologies <ul style="list-style-type: none"> ○ Environmental: gas, electricity, ammonia, nitrites, iron ○ Nutritional, toxic, iatrogenic ○ Zootechnical / management issues • Shellfish – Bacterial Diseases <ul style="list-style-type: none"> ○ Vibrio aesturianus, Vibrio tapetis ○ Francisella halioticida, Xenohalotis, Nocardia crassostreae 	

<ul style="list-style-type: none"> • Shrimp – Main Bacterial Diseases <ul style="list-style-type: none"> ○ AHPND (<i>V. harveyi</i>-clade, <i>V. parahaemolyticus</i>) ○ Necrotising hepatopancreatitis (<i>Hepatobacter penaei</i>) ○ Gaffkemia (<i>Aerococcus viridans</i>) ○ <i>Spiroplasma eriocheiris</i>, <i>Vibrio aestuarianus</i> • Shrimp – Main Viral Diseases <ul style="list-style-type: none"> ○ Decapod iridescent virus 1, IHHNV ○ Infectious Myonecrosis virus, Infectious Macrobrachium nodavirus ○ Taura Syndrome virus, Yellow Head disease virus ○ White Spot Syndrome Virus • Zoonotic Agents <ul style="list-style-type: none"> ○ Bacteria: <i>Mycobacterium marinum</i>, <i>Vibrio vulnificus</i>, <i>Streptococcus agalactiae</i>, <i>Streptococcus iniae</i>, <i>Clostridium botulinum</i> ○ Nematodes: <i>Anisakis simplex</i>, <i>Pseudoterranova decipiens/krabbei</i>, <i>Contracaecum</i> spp., <i>Gnathostoma</i> spp. ○ Cestodes: <i>Diphyllobothrium latum</i> ○ Trematodes: <i>Opisthorchis felinus</i>, <i>O. viverrini</i>, <i>Clonorchis sinensis</i>, <i>Paragonimus</i> spp. 	
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Anna Toffan	2 h
Pathologies: Viral diseases and susceptible biological species <ul style="list-style-type: none"> • General overview on the most important viral diseases in freshwater and marine species (<i>Rhabdoviridae</i>, <i>Herpesviridae</i>, <i>Betanodavirus</i>, <i>Tilapia Lake Virus – TLK</i>, etc.), broodstock status and transmission. • Overview of main shellfish viral diseases. 	2 h

Alexandre Beljean	2 h
Diagnostic: What is a disease and the clinical approach <ul style="list-style-type: none"> • General approach to the diagnosis of different diseases in farmed fish (anamnesis, clinical observation, main symptoms and lesions). • The role of farmer trained by the vet. • What happens when the farmer calls the vet for a problem .How to run a veterinary visit on an aquaculture farm.When to go to a fish farm. • Anamnesis and informations collection around the problem. 	

David Parfouru	4 h
Management of a farm system:	4 h
<ol style="list-style-type: none"> 1. How to evaluate performance of farms and animals: different parameters to evaluate and measure. 2. How to evaluate and measure properly. 3. What are normal performances (FCR, mortalities, Escapes, cycle duration...) 4. Importance of early detection of problems 5. Importance of Staff qualification and management in farm performance. 	2 h
Farm book, records, performance assessment, biosecurity and hygiene plans. The duties of a farmer/the duties of the vet, duties of institutions.	2 h

Amedeo Manfrin	4 h
Diagnostic: Disease, clinical approach, Detection of pathologies and Main Lesions (theory):	2 h
<ol style="list-style-type: none"> 1. Presentation of videos/pictures to help participants become more familiar with the different signs of disease & lesions. 2. Mortality detection/mortality levels in farms, early detection, 3. Behavioral alterations 4. alteration of performance 5. Specific/non-specific lesions 6. Larvae/algae/artemia. Fry, fingerling, grow-out, Broodstock 	
Diagnostic: what is a disease and clinical approach: The visit on the farm and the diagnostic techniques on the field (theory):	2 h
<p>Examinations at the farm: Which animals should be looked at and how to choose these animals:</p> <ol style="list-style-type: none"> 1. Necropsy 2. Macroscopical examination (Skin, Gill, Gut, Internal organs & Sampling for microscopical examination 3. Microscopical examination skin scratch, Gills, spleen, gut, gall bladder 4. Take a step back and draw first conclusions, First diagnostic and further sampling for lab analysis 5. Sampling for further laboratory diagnostics: Virology, Bacteriology, Parasitology, hematology/serology, Histology 6. First actions to take after the visit. Time and diagnostic 	

Bartolomeo Gorgoglione	1h
Pathology: Fungal and oomycete diseases	
<ul style="list-style-type: none"> • Skin diseases and systemic diseases caused by fungal and oomycete pathogens 	

Mario Ignacio Algüerno (WOAH)	2h
WOAH Principles <ul style="list-style-type: none">• General overview on international WOAH standards applied to Aquatic Animals• WOAH Aquatic Animal Health Code• WOAH Aquatic Manual	

Residential Week, 2-6 March, 2026 – X hours

Monday, March 2		
	<p>General overview on aquaculture production</p> <ul style="list-style-type: none"> ○ World aquaculture production ○ Main finfish species farmed ○ Health management steps in Aquaculture 	Alexandre Beljean
	<p>Pathologies: Parasitological diseases and susceptible biological phases based on clinical cases presentations.</p> <ul style="list-style-type: none"> ○ General overview on the most important parasitic diseases in freshwater and marine species (ectoparasites and endoparasites.) ○ Crustaceans ○ Ciliates/ flagellates ○ Monogeneans/ digeneans ○ Myxozoan ○ Microsporidian ○ Coccidia ○ Others (shellfish) 	Andrew Shinn
	Lunch	
	<p>Diagnostic activities "Hands on" - Wet Lab</p> <ul style="list-style-type: none"> ○ How to do necropsy, first observations and sampling. ○ What are the macroscopical observations and first microscopical observations that can be carried out at the farm and the wet lab. Importance of gills. Necropsy techniques. How to collect samples of : parasitic, bacterial, viral diseases. Sampling for serological and histological investigations. ○ How the vet should choose the different lab analysis he would like to get done at the lab and how to collect, store and send samples for further lab assays. ○ Sampling from gills and skin. 	A. Beljean & A.Shinn
	Coffee break	
	<p>Diagnostic activities "Hands on" - Wet Lab</p> <ul style="list-style-type: none"> ○ Sampling from intestine and bladder. ○ Observation under the microscopic. ○ Good sampling procedures for further analysis and good transportation procedures. ○ Writing a report after autopsies in the field ○ Sending samples to laboratories. 	A. Beljean & A.Shinn

Tuesday, March 3		
	Biosecurity & Hygiene organisation in Aquaculture, welfare <ul style="list-style-type: none"> ○ At Inlet and outlet ○ At farm level Biosecurity organization inside the farm: avoid transmission of bio-aggressors and organic matter between sectors, between tanks, between animals ○ Biofilms, decontamination & disinfection, control of disinfection efficacy. ○ management of biofilters & bacteria populations. ○ Mortality collection and Disposal of dead animals. ○ Outside the farm: At river (watershed level), at regional and national levels. 	A. Lebreton
	Lunch	
	Biosecurity & hygiene organisation in Aquaculture, welfare <ul style="list-style-type: none"> ○ Fish welfare. ○ Transport, grading, transfers. ○ Introduction of animals/eggs. ○ Biosecurity plan and assessment of biosecurity. 	A. Lebreton
	Coffee break	
	Biosecurity & hygiene organisation in Aquaculture, welfare <ul style="list-style-type: none"> ○ Assessment, monitoring and early detection of problems. ○ Establishing a follow up program at farms and aiming for more prevention. 	A. Lebreton

Wednesday, March 4		
	Field visit	A. Beljean/ A. Le Breton
	Lunch	
	Field visit continued and evaluation of farm system	A. Beljean/ A. Le Breton

Thursday, March 5		
	Therapy, prescription and monitoring of efficacy of treatment Resistance Management at field Veterinarian Level	A. Le Breton
	Visit N Parks	
	Lunch	

	Vaccinations and vaccination programs	A. Le Breton
	Coffee Break	
	Vaccination and vaccination programs continued	A. Le Breton

Friday March 6		
	<p>The final step: post-production, from aquaculture farm to market</p> <ul style="list-style-type: none"> ○ Good practices ○ Fish welfare during transport, live fish uploading and transport to the processing industry: truck characteristics, water parameters, fish density, etc. ○ Stabulation of fish at the transformation plant. ○ Fasting phase pre-loading, ○ Grading. ○ Killing/slaughtering methods and influence on fish quality. ○ Correct packaging, ice management, labelling, temporary storage. ○ Fresh fish shipment to market: 	A. Beljean
	Lunch	
	<p>The final step: post-production, from aquaculture farm to market, continued.</p> <ul style="list-style-type: none"> ○ Quality assessment ○ Alterations due to animal diseases. ○ alterations due to management, feeding. ○ Contaminations from environment. 	A. Beljean
	Coffee Break	
	<p>Synthesis and take away messages of the session 1 incl Systemic approach Dissemination, final words, instructions on how to evaluate the course, complete the feedback on-line, etc.</p>	A. Beljean